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The Auditory Memory and Tactual Sensibility of the Blind

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THE AUDITORY MEMORY AND TACTUAL SENSIBILITY OF THE BLIND

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Certain differences between the blind and seeing persons—notably in the excellence of memory for things heard and in tactual sensibility—have been long recognized, but the extent of these differences has not been accurately determined. This paper presents some quantitative data bearing on the question of how much superior the blind are to normal persons in mental accomplishments which are naturally relied upon because of the loss of sight. It answers the question, however, only for one group of blind boys in school, and the conclusions reached may not be altogether true of the blind as a class.

The study was made in 1914 in the Houghton Grammar School, the Rindge Technical High School, Radcliffe and Harvard College classes (all in Cambridge, Massachusetts); and the Perkins Institution for the Blind, Watertown, Massachusetts.

I. Objects of the Investigation

The report makes

1. A comparison of the abilities of the Perkins Institution boys with students of normal elementary, high school, and college groups in reproducing in writing the elements of a simple story after hearing it read once. This is known as the "Reproduction Test."

2. A comparison of the abilities of the same groups (with the exception of the elementary grades) in regard to the retention of the elements of the story after an interval of five days. This is known as the "Retention Test."

3. A comparison of the immediate memory of the Perkins Institution boys with normal boys of about the same age in the Rindge Technical High School for lists of letters and figures. This is known as the "Immediate Memory Test."

4. A comparison of the abilities of these two groups of boys in regard to solving a complicated form board puzzle. This is known as the "Form Board Test."

II. Methods of Conducting the Tests

The Reproduction Test

For testing logical memory, the story entitled "The Golden Goose," in Pyle's "The Examination of School Children" was used. The groups examined were the following:

(a) Grades II to VIII, inclusive, in the Houghton Grammar School. Number of pupils examined, 254, there being on the average 36 pupils to a class.

(b) A class in the Rindge Technical High School. There were 20 pupils in the class.

(c) A class in educational psychology in Harvard University. 14 students were tested.

(d) A class in educational psychology in Radcliffe College. 18 students were tested.

(e) A class in the Perkins Institution. There were 19 pupils in the class.

The story was carefully read once to each of the above groups, at different times. After the reading each person wrote on paper all the elements of the story he could reproduce. The Perkins Institution boys wrote with Braille-writers or typewriters. There was no time limit. The tests were uniformly conducted. In all, 323 individuals were examined.

When all the papers were collected, they were examined for the purpose of deciding what should constitute the various elements of the story. There were found to be fifty elements in the complete story. Using that number as a basis, each paper was given a percentage. The charts on opposite page show the results obtained.

In chart I, the percentages of pupils in the various classes capable of reproducing from 67% to 100% of the elements of the story are represented; *e. g.*, all, that is 100% of the blind boys reproduced between 67% and 100% of the story. Whereas, but 60% of the Rindge boys, with whom, in age, training, etc., they are most nearly comparable, could reproduce this much of the story.

In chart II, the average abilities of the several groups are compared. The tops of the columns indicate the average percentage reproduced. The blind boys lead with an average percent. of reproduction of 87.7%, the Rindge boys having an average percent. of reproduction of 69.9%. The Radcliffe and Harvard students have somewhat higher percentages than the Rindge but considerably less than those of the blind.

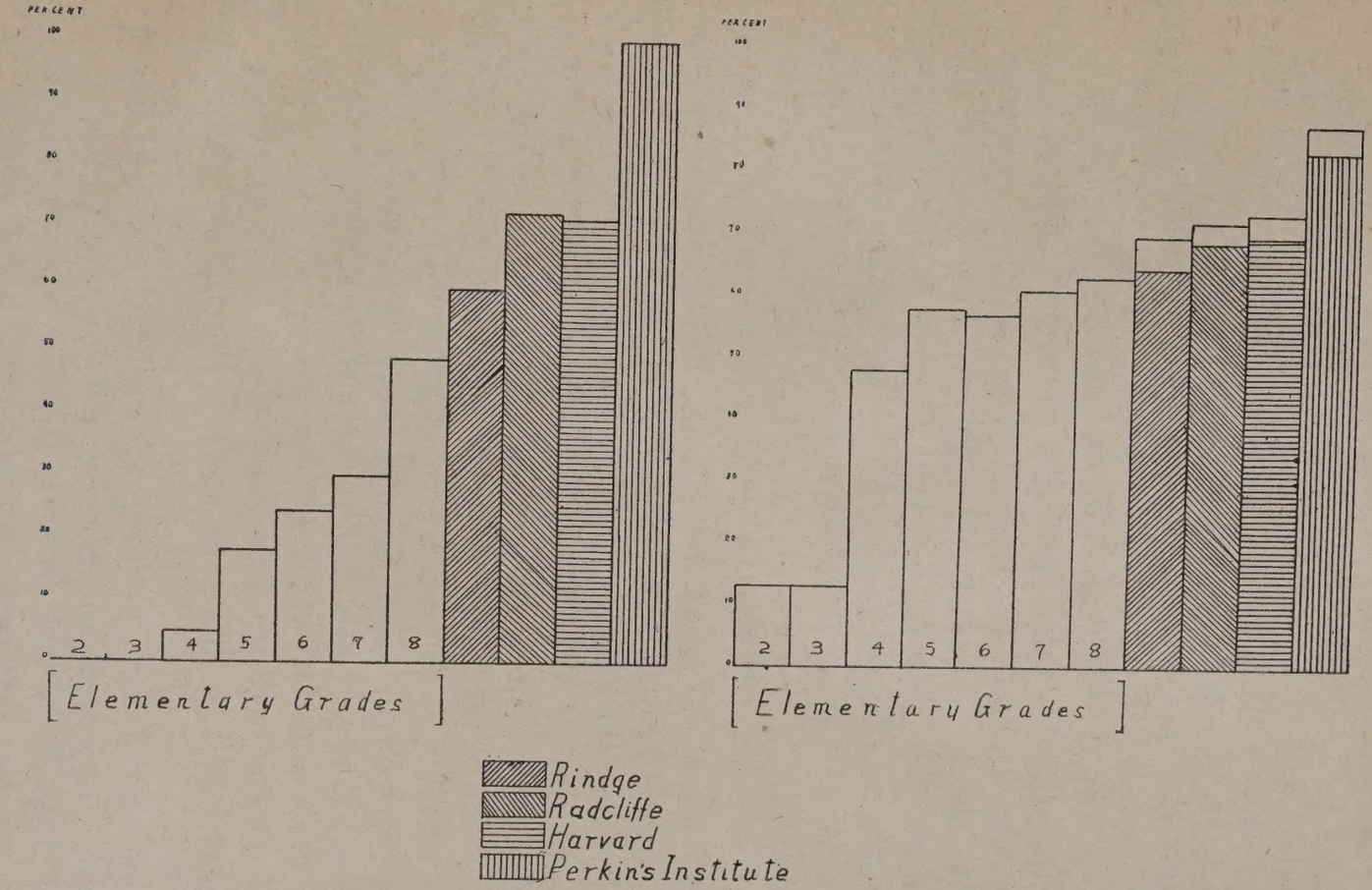

Chart I. Percentage by classes of those reproducing between 67% and 100% of the elements of the story.

Chart II. Average percentages of reproduction and retention. The tops of the columns represent the average per cent. reproduced; the shades parts of columns indicate the proportion retained after 5 days.

The Retention Test

The groups examined for the retention of the elements of the "Golden Goose" were the same as for the test just described except that the elementary grades were not included.

After an interval of five days from the reading of the first test, the persons examined were asked to reproduce again as many of the elements of the story as possible. They had not been told that the test would be repeated. Those who had considered the story since the first writing were asked to indicate that fact on their papers. Their papers were not included in the results of this test. There was no time limit.

These papers were carefully examined, and given percentages as in the first case.

The shaded parts of the columns in chart II indicate that proportion of the reproduced matter which was retained after five days. The actual percentages are as follows: Perkins Institute, 95.9%; Radcliffe, 95.2%; Harvard, 95.1%; Rindge, 92.4%.

The Immediate Memory Test

The groups examined for immediate memory of lists of letters and numbers were a class of boys in the Perkins Institution (not in all cases the same pupils as considered above) and a group of boys in the Rindge Technical School of about the same ages.

There were seven lists in all, four of letters chosen at random and three of numbers chosen in like manner. These lists varied from twelve to fifteen letters or numbers respectively. Each list was read once, then the students reproduced as many of the units of it as possible. The tests were marked I to VII inclusive, the first four being of letters. The Perkins Institution boys used Braille-writers and typewriters for their lists. There was a time limit of thirty seconds. The tests were uniformly conducted.

Incorrect letters or numbers omitted and additional ones were counted as errors in assigning percentages to the papers. Nineteen blind boys and twenty Rindge boys competed in this test. The results obtained are tabulated below. (The numbers are the percentages correctly reproduced.)

Test.....	I	II	III	IV	V	VI	VII
Rindge.....	46.9	46.2	46.5	48.6	49.4	65.7	67.2
Perkins.....	55.2	49.9	46.0	44.1	51.4	44.9	54.4

For example, the Rindge students were able to produce 46.9% of the letters correctly in Test I, while the percent. for the Perkins Institution boys is 55.2. It will be noted, however, that the percents. do not indicate a dominant superiority in the favor of either group, the Perkins boys being as often below as above their competitors in average abilities. There is some evidence of the effect of practice in the course of the seven tests in the case of the Rindge pupils, which does not appear in the results of the blind boys.

The Complicated Form Board Test

The groups were the same as for immediate memory. They were not, however, in all cases the identical pupils. For a test of tactual and kinaesthetic sensibility, a form board puzzle was used into which blocks of various forms exactly fitted into correspondingly shaped depressions. In some cases two or more blocks were required to fill the depression. The Rindge students were blind-folded. The test was given individually in succession.

A preliminary period of thirty seconds was allowed each pupil for the purpose of learning the locations of the depressions and the shapes of the blocks. Except for this, there was no time limit, but the time required in each case to place each block correctly into its proper depression was carefully noted. Each boy's age was noted also. Every attempt or accomplishment of placing the wrong blocks in a depression was counted as an error. The results of this test are shown below by averages.

	Age	Errors	Time
Perkins.....	16 yrs. 8 mo.	3.8	4.2 min.
Rindge.....	17 yrs. 5 mo.	12.6	5.9 min.
Difference.....	+9 mos.	+ 8.8	+1.7

That is, the Rindge boys are nine months older, take one and seven-tenths minutes longer, and make eight and eight-tenths more mistakes than the Perkins Institution boys.

III. Summary

The conclusions which may be drawn from this particular investigation are as follows:

I. The blind boys of the Perkins Institution as a group are superior in the memory for a passage of prose read to them to a normal group of boys of approximately their own age, and to classes of adult college men and women. The extent of this

superiority is shown by a comparison of the averages of the groups in chart II, and still more strikingly by chart I, where the Perkins Institution boys are found entirely in the highest division.

II. The blind as a class retain a somewhat higher percentage of the elements in logical memory than do any other group. This is shown by shaded portions of chart I, which represents the Perkins boys leading with an average of 95.9% of their original ability.

III. The superiority shown in the logical memory of the blind does not manifest itself in immediate memory for numbers and letters. The reason for this difference appears to the writers to be that the immediate memory for numbers and letters is in comparison with the logical memory a relatively unpractised ability in the case of all subjects.

IV. The higher degree of sensibility to touch and to the feelings of movement and position in the blind is demonstrated. Normal boys about nine months older than the blind boys require nearly half again as much time, and make about three times as many mistakes, in solving a complicated form board puzzle.

The study, as a whole, gives some definite notion of the extent to which prolonged special training may develop special abilities.

The blind as a class are trained to listen attentively and their educational system depends on the high development of the sense of touch. They have exceptional need for the development of these senses; for they must remember what is told them or be subjected to numerous inconveniences and difficulties, and they cannot read their Braille books unless their finger-tips are highly trained. For these reasons they devote years to the special training of these senses.

The effect of this training appears in the excellence of memory for the passage of prose read to them. In the case of the immediate memory for isolated numbers and letters, they are likely, however, to receive no more training than ordinary individuals, and they show no superiority. This indicates that their special abilities are limited to the things in which they are especially trained, and supports the results of other experiments in showing how narrow may be the influence of special training. It should be added, however, that the significance of this last conclusion is lessened by the fact that even direct practice in the case of the auditory memory span for numbers, letters, etc., is relatively limited in its effect.